Applicants respectfully submit that the Examiner has misinterpreted the subject matter of the present claims. As written the present claims are directed to compositions comprising: (1) an electrode comprising a self assembled monolayer (SAM) and a capture probe; and (2) a label probe or a target sequence comprising at least one covalently attached ETM. Therefore, the present claims are directed to statutory subject matter, i.e., compositions comprising electrodes.

Moreover, the term "target sequence" is clearly defined in the specification. For example, on page 56, lines 5-12, the specification states:

> The term "target sequence" or grammatical equivalents herein means a nucleic acid sequence on a single strand of nucleic acid. The target sequence may be a portion of a gene, a regulatory sequence, genomic DNA, cDNA, RNA including mRNA and rRNA, or others. It may be any length, with the understanding that longer sequences are more specific. As will be appreciated by those in the art, the complementary target sequence may take many forms. For example, it may be contained within a larger nucleic acid sequence, i.e., all or part of a gene or mRNA, a restriction fragment of a plasmid or genomic DNA, among others.

Clearly, the term "target sequence" refers to a polynucleotide product, not a written representation of such a product. Therefore the present claims are not rendered unpatentable by including a "target sequence" in the claimed composition.

Accordingly, Applicants respectfully request that rejection of claims 1-25 under 35 U.S.C. §101 be withdrawn.

Claim Rejection - 35 USC §112, First Paragraph

Best Mode

Claims 23-25 and their dependent claims stand rejected under 35 USC §112, first paragraph, for failing to satisfy the best mode requirement. In making the rejection, the

Examiner states that the invention as disclosed in the specification requires that a SAM comprise conductive oligomers, and that such a requirement is absent in the claims.

As a preliminary matter, Applicants respectfully submit that the Examiner has misinterpreted the definition of SAM as set forth in the specification. As stated in the specification, the SAM in the present invention may comprise conductive oligomers alone or a mixture of conductive oligomers and insulators. *See* page 11, lines 26-27. Thus, claims 23-25 recite a SAM that may comprise conductive oligomers or a mixture of conductive oligomers and insulators.

Applicants further submit that the Examiner has misunderstood the best mode requirement. The best mode requirement is incorporated in 35 USC §112, first paragraph, which states, "[t]he specification...shall set forth the best mode contemplated by the inventor of carrying out his invention." *See also* MPEP § 2165. Therefore, an applicant is required to disclose in the specification his contemplated best mode for carrying out the invention disclosed in the claims. However, he is not required to claim what is described as the "best" in the specification.

Accordingly, Applicants respectfully request that the rejection of claims 23-25 and their dependent claims under §112, first paragraph be withdrawn.

Enablement

Claims 23-25 and their dependent claims are further rejected under 35 U.S.C. §112, first paragraph for lack of enablement. The Examiner asserts that the specification is enabling for electrodes comprising monolayers comprising conductive oligomers, but does not reasonably provide enablement for electrodes comprising non-conductive oligomers.

As mentioned above, the SAM in the present invention may comprise conductive oligomers alone or a mixture of conductive oligomers and insulators. Insulators, as defined in

the specification, refer to substantially nonconducting oligomers, which are generally alkyl or heteroalkyl oligomers or moieties with sigma bonds. *See* page 22, lines 7-8. Description of insulators can be found throughout the specification. For example, on page 22, line 7- 31, suitable insulators are disclosed. On page 23, lines 5-20, various combinations and ratios of conductive oligomers and insulators are described. In addition, pages 23-25 describe covalent attachment of insulators to electrodes. Figure 9 and descriptions thereof describe the synthesis of an insulator to the ribose of a nucleoside for attachment to an electrode. Furthermore, insulators are also depicted in various structures throughout the specification, for instance in structures 10, 11, 12, 13, and 17. It is thus apparent that the specification provides ample enablement for electrodes comprising non-conductive oligomers.

Accordingly, Applicants respectfully request withdrawal of rejections of claims 23-25 under §112, first paragraph.

Double Patenting

Claims 1-10, 20-24 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 18-35 of U.S. Patent No. 6,096,273. A terminal disclaimer listing US Patent No. 6,096,273 is enclosed. Applicants respectfully request withdrawal of the rejection.

Claim Rejection - 35 USC §103

Claims 1-10, 20-24 stand rejected under 35 USC §103(a) as being unpatentable over U.S. Patent No. 6,096,273.

The Examiner acknowledges that the present invention was owned by, or subject to an obligation of assignment to, the same entity as U.S. Patent No. 6,096,273 at the time this

invention was made. The Examiner nonetheless finds that U.S. Patent No. 6,096,273 qualifies as prior art under 35 USC §102(e) and accordingly is a prior art under 35 USC §103(a).

Applicants respectfully submit that under 35 USC §103(c), subject matter which would otherwise be prior art under 35 USC §103 via 35 USC §102(e) is disqualified as prior art against the claimed invention if that subject matter and the claimed invention "were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person." MPEP 706.02(l)(1). This rule applies to all patent applications filed on or after November 29, 1999, including continued prosecution application (CPA) filed under 37 CFR 153(d). *Id.*

The present application was originally filed on August 17, 1998, and filed as a CPA on September 14, 2000. Therefore, under 35 USC §103(c), US Patent No. 6,096,273 does not qualify as a 35 USC §103(a) prior art. Applicants thus respectfully request that the rejection be withdrawn.

Claim Rejection - 35 USC §102

Dong et al.

Claims 1-10, 23, 24 stand rejected under 35 USC §102(b) as being anticipated by Dong et al. Applicants respectfully submit that Dong et al. do not anticipate the present invention.

Dong et al. teach a biosensor comprising redox proteins and enzymes immobilized covalently to a gold electrode via a self-assembled monolayers of 3-mercaptopropionic acid. Such biosensors can be used for detection of analytes, such as H2O2, glucose, and cholesterol.

Claims 1-10, 23 and 24 of the present application, on the other hand, are directed to compositions for electronic detection of nucleic acids. *See* page 1, Filed of the Invention. As mentioned above, the present claims are directed to compositions comprising: (1) an electrode comprising an SAM and a capture probe; and (2) a labeled probe or a target sequence comprising at least one covalently attached ETM. "Target sequence" in the present claims specifically refers to a nucleic acid sequence on a single strand of nucleic acid. Similarly, "label probe" refers to nucleic acid. *See* page 39, lines 31-33.

As the examiner is aware, the law is well established that in order to anticipate a claim, the prior art must disclose "each and every claim" of the claimed invention. *SSIH Equipment S.A. v. U.S. Inc. Int'l. Trade Commission*, 218 USPQ 678, 688 (Fed. Cir. 1983).

Dong et al. neither teach nor suggest a target sequence or a label probe. Nor do they teach or suggest ETMs covalently attached to either a target sequence or a label probe. Since "each and every claim" is not present, Dong et al. do not anticipate the present invention.

Accordingly, Applicants respectfully request that rejection of claims 1-10, 23 and 24 under 35 U.S.C. §102(b) be withdrawn.

Duan et al.

Claims 1-10, 23, 24 are further rejected under 35 USC §102(b) as being anticipated by Duan et al. Applicants respectfully submit that Duan et al. does not anticipate the present invention.

Duan et al. teach an immunoassay for proteins utilizing a capture monoclonal antibody immobilized covalently on a microporous gold electrode via a self-assembled monolayer of thioctic acid.

The present invention is discussed above.

As mentioned above, in order to anticipate a claim, the prior art must disclose "each and every claim" of the claimed invention.

Duan et al. neither teach nor suggest a target sequence or a label probe. Nor do they teach or suggest ETMs covalently attached to either a target sequence or a label probe. Since "each and every claim" is not present, Duan et al. do not anticipate the present invention.

Accordingly, Applicants respectfully request that rejection of claims 1-10, 23 and 24 under 35 U.S.C. §102(b) be withdrawn.

CONCLUSIONS

Applicants respectfully submit that all pending claims of the above referenced application satisfy the requirements of patent ability and are in condition for allowance. Accordingly, early notification of such allowance is earnestly solicited.

If after review, the Examiner feels there are further unresolved issues or determines that prosecution of the instant application would benefit from a telephone interview, the Examiner is invited to call the undersigned attorney at (415) 781-1989.

Respectfully submitted,
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Dated: 5/8/02

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APPENDIX OF PENDING CLAIMS

1. A composition comprising:

a) an electrode comprising:

i) a self-assembled monolayer comprising conductive oligomers; and

ii) a capture probe;

b) a target sequence comprising a first portion that is capable of hybridizing to said capture probe, and a second portion that does not hybridize to said capture probe and comprises at least one covalently attached electron transfer moiety (ETM).

2. A composition comprising:

a) an electrode comprising:

i) a self-assembled monolayer comprising conductive oligomers; and

ii) a capture probe;

b) a label probe comprising a first portion that is capable of hybridizing to a component of an assay complex, and a second portion comprising a recruitment linker that does not hybridize to a component of assay complex and comprises at least one covalently attached electron transfer moiety (ETM).

3. A composition according to claims 1, 2, 23, or 24 wherein said ETM is ferrocene.

4. A composition according to claim 1, 2, 23, or 24 wherein said label probe comprises a plurality of ETMs.

5. A composition according to claim 1, 2, 23, or 24 wherein said first portion of said label probe further comprises a covalently attached ETM.

6. A composition according to claim 1, 2, 23, or 24 wherein said assay complex comprises an amplifier probe.

7. A composition according to claim 1, 2, 23, or 24 wherein said assay complex comprises a capture extender probe.

8. A composition according to claim 1, 2, 23, or 24 wherein said monolayer further comprises insulators.

9. A composition according to claim 1, 2, 23, or 24 wherein said capture probe is attached to said electrode via a conductive oligomer.

10. A composition according to claim 1, 2, 23, or 24 wherein said capture probe is attached to said electrode via an insulator.

11. A method of detecting a target nucleic acid sequence in a test sample comprising:

a) forming a hybridization complex including said target sequence and a capture probe; wherein said capture probe is on an electrode comprising a self-assembled monolayer comprising conductive oligomers;

b) directly or indirectly attaching at least one label probe to said target sequence to form an assay complex, wherein said label probe comprises a first portion capable of

hybridizing to a component of said assay complex, and a second portion comprising a recruitment linker that does not hybridize to a component of said assay complex and comprises at least one covalently attached electron transfer moiety (ETM); and

c) detecting the presence of said ETM using said electrode.

12. A method according to claim 11or 25 wherein said label probe comprises a plurality of ETMs.

13. A method according to claim 11or 25 wherein said target seuqence is attached to said electrode by hybridization to a capture probe.

14. A method according to claim 11 wherein said target sequence is attached to said electrode by hybridizing a first portion of said target sequence to a first capture extender probe, and hybridizing a second portion of said first capture extender probe to a capture probe on the electrode.

15. A method according to claim 11or 25 wherein said target sequence is attached to said electrode by

a) hybridizing a first portion of said target sequence to a first portion of a first capture extender probe;

b) hybridizing a second portion of said first capture extender probe to a first portion of an capture probe on the electrode;

c) hybridizing a second portion of said target sequence to a first portion of a second capture extender probe; and

d) hybridizing a second portion of said second capture extender probe to a second portion of said capture probe.

16. A method according to claim 11or 25 wherein said label probe is attached to said target sequence by hybridizing said first portion of said label probe to a first portion of said target sequence.

17. A method according to claim 11or 25 wherein said label probe is attached to said target sequence by

a) hybridizing a first portion of an amplifier probe to a first portion of said target sequence; and

b) hybridizing at least one amplication sequence of said amplifier probe to said first portion of at least one label probe.

18. A method according to claim 11or 25 wherein said label probe is attached to said target sequence by

a) hybridizing a first portion of a first label extender probe to a first portion of a target sequence;

b) hybridizing a second portion of said first label extender probe to a first portion of an amplifier probe;

c) hybridizing at least one amplication sequence of said amplifier probe to said first portion of at least one label probe.

19. A method according to claim 11or 25 wherein said label probe is attached to said target sequence by

a) hybridizing a first portion of a first label extender probe to a first portion of a target sequence;

b) hybridizing a second portion of said first label extender probe to a first portion of an amplifier probe;

c) hybridizing a first portion of a second label extender probe to a second portion of a target sequence;

d) hybridizing a second portion of said second label extender probe to a first portion of an amplifier probe;

e) hybridizing at least one amplication sequence of said amplifier probe to said first portion of at least one label probe.

20. A composition according to claim 1, 2, 23, or 24 wherein said second portion is not nucleic acid.

21. A composition according to claim 20 wherein said second portion is a metallocene polymer.

22. A composition according to claim 21 wherein said metallocene polymer is a ferrocene polymer.

23. A composition comprising:

a) an electrode comprising:

i) a self-assembled monolayer; and

ii) a capture probe;

b) a target sequence comprising a first portion that is capable of hybridizing to said capture probe, and a second portion that does not hybridize to said capture probe and comprises at least one covalently attached electron transfer moiety (ETM).

24. A composition comprising:

a) an electrode comprising:

i) a self-assembled monolayer; and

ii) a capture probe;

b) a label probe comprising a first portion that is capable of hybridizing to a component of an assay complex, and a second portion comprising a recruitment linker that does not hybridize to a component of assay complex and comprises at least one covalently attached electron transfer moiety (ETM).

25. A method of detecting a target nucleic acid sequence in a test sample comprising:

a) forming a hybridization complex including said target sequence and a capture probe; wherein said capture probe is on an electrode comprising a self-assembled monolayer;

b) directly or indirectly attaching at least one label probe to said target sequence to form an assay complex, wherein said label probe comprises a first portion capable of hybridizing to a component of said assay complex, and a second portion comprising a recruitment linker that does not hybridize to a component of said assay complex and comprises at least one covalently attached electron transfer moiety (ETM); and

c) detecting the presence of said ETM using said electrode.